

**REMARKS**

Interview Summary

Applicants thank Examiner Iqbal and his supervisor for the courtesies extended to the undersigned attorney on August 3, 2010.

During the interview, the undersigned attorney explained why Applicants believed a *prima facie* case of obviousness is not established by the art of record. All of the points raised during the interview are included in the present written response.

Examiner Iqbal indicated that he would review the cited art, as well as Wakamura et al. (discussed below), and would reconsider the rejections of record based on the points raised in the response.

Application Status and Disposition of Claims

This paper responds to the Final Office Action mailed April 6, 2010. In the Final Action, the Office considered claims 3, 6, 7, 9, 10, 13-15, and 18.

With this paper, no claims are amended, added, or canceled. Thus, claims 3, 6, 7, 9, 10, 13-15, and 18 remain pending and under consideration.

Claim Rejections – 35 U.S.C. § 103

The Action rejects claims 3, 6, 7, 9, 10, 13-15, and 18 under 35 U.S.C. § 103 as allegedly unpatentable over Atsumi et al. (JP 10-118167) in view of Ichitsuka et al. (U.S. Patent NO. 5,651,884). The Action also rejects the same claims over Ichitsuka et al. in view of Atsumi. Applicants respectfully disagree with the rejections for the reasons that follow.

Initially, Applicants note that the two rejections will be addressed together, because their different structure makes no difference to the merits of the rejection. In particular, Applicants

submit that the two rejections fail for the same reason – a fundamentally incorrect assumption about the technology.

The Action relies on Atsumi et al. for its teaching of combining a slurry of an apatite compound with a source of trivalent iron, so that the iron will bind to the phosphate of the apatite in the slurry. Noting that the present claims recite preparing a column by filling its space with apatite and then passing a solution containing  $\text{Fe}^{3+}$  over the column, and that Atsumi et al. fails to teach that process, the Action relies on Ichitsuka et al. for its teaching of columns filled with apatite compounds. The Action essentially asserts that it would be obvious to replace Atsumi et al.'s slurry process by loading Ichitsuka et al.'s column with Atsumi et al.'s apatite and flowing a source of trivalent iron over the column, with an expectation of achieving the same result as Atsumi et al. The expectation of achieving the same result with the column as in the slurry is *critical* to maintaining the rejection, as the Office Action fails to provide any alternative basis for making the replacement.

However, it is on this expectation of similar results that the Office is mistaken. In this regard, Applicants respectfully direct the Office's attention to Wakamura et al., Colloids and Surfaces 164: 297-305 (2000), which was provided in the IDS filed April 23, 2008. Wakamura et al. specifically studied the exchange of calcium in calcium-containing apatite for trivalent iron (among other metals), and found that the method of performing the exchange (and the particular metal ion) has profound effects on whether exchange occurs. For example, Wakamura et al. states that "[calcium-apatite] substituted with Fe(III) by the coprecipitation method had one kind of surface Fe-OH, but those by the *immersion method* had no surface Fe-OH. The exchange mechanism with metal ions depends on the substituting method and kinds of metal ions." (Page 304, Conclusions, emphasis added.)

Applicants note that Atsumi et al. discloses that a slurry of an apatite is added to a solution containing  $\text{Fe}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$  as a metallic salt. That is, the apatite is *immersed* into the solution to thereby obtain an adsorbent comprising the apatite with  $\text{Fe}^{3+}$ . (See paragraphs 0055 and 0056 of Atsumi et al.). Applicants respectfully submit that what is occurring in Atsumi et al.

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is an exchange of  $\text{Ca}^{2+}$  for  $\text{Fe}^{3+}$  *within* the apatite, not on its surface. This conclusion is supported by the fact that Atsumi et al. discloses that  $\text{Ca}^{2+}$  contained in the apatite is easily ion-exchanged and the ratio between  $\text{Ca}^{2+}$  and  $\text{PO}_4^{3-}$  contained in the apatite is changed, depending on the kinds and/or amounts of metal elements to be carried. (See paragraphs 0030 and 0031 of Atsumi et al.) This conclusion is also supported by Wakamura et al., which found no surface Fe-OH with immersion.

Applicants further note that this difference in the end product between what is obtained by Atsumi et al.'s method and the present method is particularly germane to obviousness. That is, because Atsumi et al. produced a product that differed structurally from that produced by the present method – and in fact, could not have produced the same product obtained by the present method – Atsumi et al. would not have sought modifications or optimizations that would result in a particular surface structure. In other words, Atsumi et al. could not have recognized that a particular form, particle size, or flow rate might affect the surface structure of the apatite. Thus, the Office's assertion that "it would be obvious to one having an ordinary level of skill in the art to perform routine experimentation to find a suitable or optimal value for parameters such as the particle size and Fe flow rate" (page 3, second full paragraph) clearly lacks foundation.

Additionally, to the extent that the Office maintains any rejection that is based upon arguments of optimization, Applicants respectfully note that the Office bears the burden of showing that such features are result-effective variables. In this regard, Applicants submit that the Office's statement that "Applicants do not provide [any reason] why it would not be obvious for one skilled in the art to determine a suitable flow rate" (page 4, first paragraph) misapprehends the burden. The Office has failed to establish that changing the flow rate would result in any change in structure.

Finally, in response to the Office's assertion that "there is no evidence of record for the contention of unexpected results emanating from using the flow rate in combination [with] particle size" (page 4, first paragraph), Applicants note that this is based upon a fundamentally flawed view of the technology. The Office fails to see that the results are unexpected because it

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fails to appreciate that Atsumi et al. could not have produced the present results. Once it is understood that Atsumi et al. could not have led to the composition achieved by the present invention, one must conclude that the results are unexpected in view of Atsumi et al. and Ichitsuka et al.

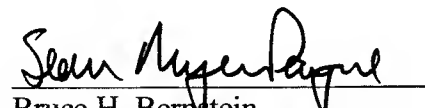
In view of the foregoing remarks, Applicants respectfully submit that the combination of Atsumi et al. and Ichitsuka et al. (in any proper manner) fails to establish a *prima facie* case of obviousness. Applicants respectfully request withdrawal of the rejection.

Conclusion

In view of the foregoing remarks, the Examiner is respectfully requested to reconsider and withdraw the rejections of record, and allow each of the pending claims.

If any issues yet remain which can be resolved by telephone, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below.

Respectfully submitted,  
Shintaro KOBAYASHI et al.

  
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August 3, 2010  
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